

NYMPHONELLA TAPETIS, N. G., N. SP., A PYCNOGON  
PARASITIC IN A BIVALVE

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FOUR FIGURES

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Some individuals of the edible bivalve *Paphia (Tapes) philippinarum* occurring on the shores of Fukuoka, Japan, have been found to contain in their mantle cavity a species of pycnogons in various stages of development. Examinations of 144 individuals of *Paphia*, which were collected in April of this year (1926) and measured about 20–30 mm. in the greatest diameter of the shell, show that 51 of them, namely 35 per cent., were victims of the parasites, which latter were 99 in number. Further, among 80 shells collected in August there were 6 containing the pycnogons. The parasites here in this lot were 8 in number, all being very young.

The body of the largest specimen of the pycnogon (fig. 1, 2) measures 7 mm. in length inclusive of proboscis, which is 2 mm. long, distinctly bent ventrad, and has at its middle a slight constriction. The trunk is slender and devoid of spines, and resembles *Nymphon* in its general configuration. The head is nearly triangular in shape with four eyes at its centre. There is only a low elevation which hardly deserves the name ocular tubercle. The abdomen is slender, 1.5 mm. long. The scape of chelifor single-segmented, about 1.2 mm. in length; thus not exceeding the proboscis, but is about as thick as the latter. The chela is tolerably

1 Read before the sectional meeting for zoology and fisheries of the Third Pan-Pacific Science Congress, held in Tokio, on Nov. 3, 1926. Published by the permission of the National Research Council of Japan. Contributions from the Zoological Laboratory, Kyushu Imperial University, No. 7.

developed. The palp has 9 segments, of which the 2nd is the longest and the 9th is nearly as long as the 2nd, the 4th is about

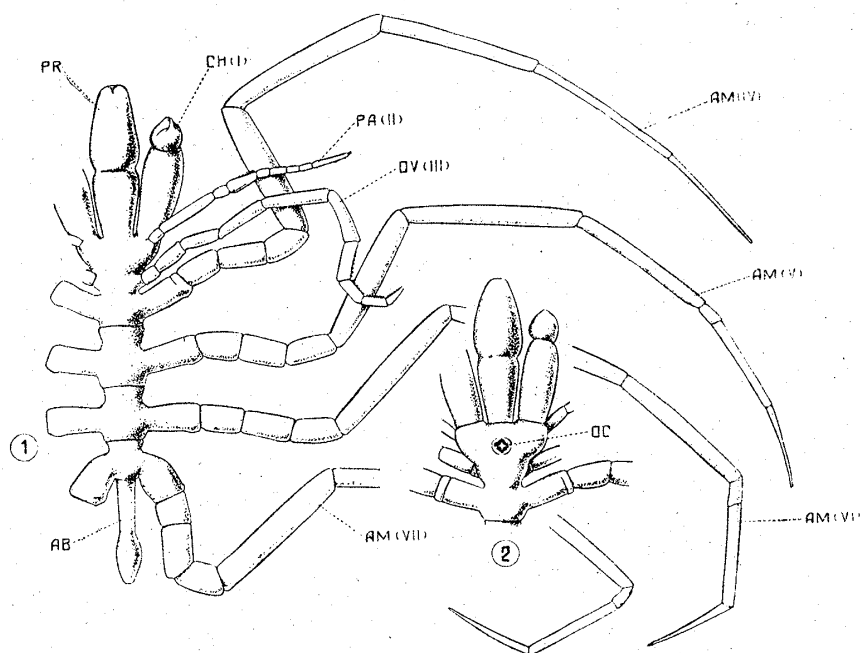


Fig. 1 The largest specimen seen from ventral side. The proboscis is stretched out so as to lie along the body axis.

Fig. 2 Anterior part of the same seen from dorsal side. AB, abdomen; AM, ambulatory legs; CH, chelifer; OC, eyes; OV, oviger; PR, proboscis.  $\times 8$

two-thirds the length of the 9th, and is armed with about 10 spines arranged in two rows. The remaining segments are all quite short, the 6th being a little longer than the rest. A more or less conspicuous spine is found at the end.

The oviger is much longer than the palp, consisting of 10 segments. The first segment is the shortest, and the following segments from 2nd to 6th are subequal in length, the 5th a little surpassing the rest. The four distal segments 7th, 8th, 9th and 10th are shorter than the foregoing, gradually decreasing in length in the order named, and together tend to coil. Each of these four has a row of spines, which are rather inconspicuously denticulate. The 7th and 10th segments have each about 12-15 such spines, while the 8th and 9th have always a lesser number, about 10, of them.

There are four pairs of ambulatory legs which are long and slender, measuring about 11–12.5 mm. in total length. The first pair are only 8-segmented. The three coxal segments are all very short, and remaining distal ones are long and about equal to one another in length. The other three pairs of legs are uniform in shape, consisting of 9 segments; the three coxal segments and the first tarsal are quite short, first tibial is the longest, the thigh, 2nd tibial and 2nd tarsal are next to it and are about equal to one another. The terminal segment, which does not form a claw, is still a little shorter than these. No accessory claws present. The legs are destitute of spines or bristles. The skin is very soft, and the color in life was whitish or dull yellow all over.

Genital openings could not be made out with certainty, probably due to the fact that all the specimens available were not mature enough.

The youngest specimen found (fig. 3) is about 0.5 mm. long, and it has three large pairs of appendages, namely, the chelifor, palp, and oviger, besides four pairs of finger-shaped rudiments of the ambulatory legs.

The chelifors are the most conspicuous parts of the body, being large and robust, directing antero-ventrad, with strong chela. They are a little longer than the proboscis, which is directed ventrad but does not show any constriction at its middle. The palp and oviger are about half as thick as the chelifor, and of about equal length, namely 0.4 mm. The former is directed almost trans-

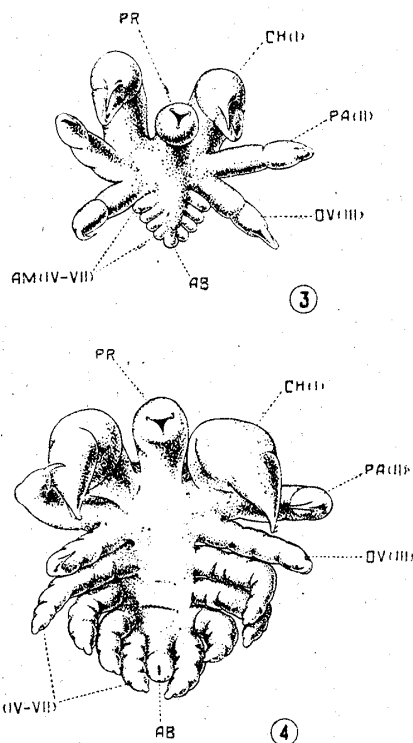


Fig. 3 The youngest specimen seen from ventral side.

Fig. 4 Somewhat advanced specimen seen from ventral side. Letters as in the fig. 1, 2.  $\times 30$

versely, while the latter turns obliquely posteriorly. They are both inconspicuously two-segmented, and are armed each with a sharp bent claw at the end. All the four pairs of the ambulatory legs are very short, the first pair being only 0.1 mm. in length, and the following pairs diminishing in length by degrees, the last pair being like knobs.

Thus all of the four pairs evidently make their first appearance almost simultaneously. Such a mode of development of the ambulatory legs is quite unusual among the pantopods. In all the cases as far as I know, the legs appear and develop one pair after another, *i.e.*, the first pair assume almost an adult form before the appearance of the second pair, while the third pair do not appear until the second become well developed, and so on. No joints are visible in these appendages nor in the trunk. Between the last pair of legs lies the abdomen which is also nothing but a knob.

In the following stages, where the ambulatory legs are growing longer, the chelifer still remains quite large and conspicuous, while the oviger is a little weaker in development than the palp. In further development (fig. 4), all the appendages show more or less visible joints. While the four ambulatory legs have a finger-like end without a claw, both the palp and oviger still retain at their end a sharp bent claw. Later, when the oviger surpasses the palp in its length, showing 10 segments, and a row of some spines on the four distal segments has appeared, the terminal claw gradually degenerates. The palp, on the other hand, retains its claw considerably a long while.

These parasitic pycnogons were found attached to the gills, visceral mass, and mantle of the host. Young were mostly found on the gills, fixing their body to the latter by means of the three anterior pairs of appendages, which are armed with chelae or claws. The proboscis was seen inserted into the soft tissues of the host. The body of such young individuals was usually surrounded with dirty brownish substance consisting chiefly of diatoms and other micro-organisms. It is probable that the chelae and claws cause bleeding on the part of the host, and the micro-organisms are thus caught by coagulating blood.

The number of the pycnogons found in one host varies from 1

to 3 in most cases. But there were 5 parasites in four cases, and 7 in another case.

A species of commensal crabs, *Pinnotheres latissimus*,<sup>2</sup> is often found in the mantle cavity. Out of 144 shells examined, there were 25 individuals, namely 17 per cent., containing one or more crabs. The total number of the crabs found was 34. Cases where the pycnogon and the crab lived together in one and the same shell were rather rare, there being found only five such cases.

None of the pycnogons examined could be said as sexually mature. It seems highly probable that the parasites leave the bivalve shell after killing it, to become mature and mate. Thorough search for free-living pycnogons on the shore has proved failure.

The question how the eggs reach the mantle cavity of *Paphia* is not easy to answer at present. I found a small number of eggs in early cleavage stages, measuring 100–120 $\mu$  in diameter, contained isolated inside the gill. From comparison with the feature worked out by Merton<sup>3</sup> in *Nymphon parasiticum*, it is quite possible that these are eggs of the pycnogon in question. *Nymphon parasiticum* is a parasite found on the sole of a nudibranch, *Tethys leporina*, in Naples. Merton found some eggs containing quite advanced embryos of this parasite lying scattered underneath the skin along the margin of the sole and of the cephalic hood of *Tethys*. In striking accordance with my case, the young of Merton's *Nymphon* had a pair of well developed chelifors, and the eyes had a very low ocular tubercle. But quite different is the fact that, while in my case it is the palps and ovigers that grow large at first and serve as attaching organs, in Merton's case the palps and ovigers remain small, and the first pair of ambulatory legs first grow large, and then the subsequent pair, and so on.

A parasitic pycnogon feeding upon bivalve shells seemed to have been known to Linnaeus more than a century and a half ago,

2 I am indebted to Dr. Mary J. Rathbun, who kindly identified the species for me.

3 HUGO MERTON: Eine auf *Tethys leporina* parasitisch lebende Pantopoden-larve (*Nymphon parasiticum*, n.sp.). Mitt. Zool. Stat. Neapel. Bd. 18, Heft. 1, 1906.

but his statement has never been reaffirmed since his days.<sup>4</sup> As the pycnogon here described seems to me to belong to none of the known genera of the Pantopoda, I propose to it the name *Nymphonella tapetis*, n. g., n. sp. The species may be regarded as an aberrant form of the Nymphonidae, or may perhaps deserve establishing a new family.

*Nymphonella*, n. g.

Body slender. Proboscis directed ventrad, with a slight constriction at the middle. Ocular tubercle very low. Chelifor shorter than proboscis, its scape being rather thick and single-segmented. Palp 9-segmented, with a spine at the end. Oviger 10-segmented, some distal segments bearing a row of denticulate spines. Ambulatory legs devoid of claws; the first pair 8-segmented, while the other three pairs are all 9-segmented.

*Nymphonella tapetis*, n. sp.

Besides the generic characters given above, the following points may be noted as characteristic of the new species:—

Body and legs slender, devoid of spines. Proboscis about  $2/5$  the length of body. Abdomen slender, shorter than proboscis. Chelifor nearly as thick as proboscis, with tolerably developed chela. Of 9 segments of the palp, 2. is the longest, 9. next to it, 4. about  $2/3$  the length of 9., while the other six are much shorter than these three. In oviger the segment 5. is the longest, 2. 3. 4. and 6. subequal and a little shorter than 5. The segments 7.-10. still shorter, gradually decreasing in length. The 1. is the shortest.

4 Through the kindness of Mr. K. Kishida of Tokio I am informed that he had found a few pycnogons in *Paphia* shells caught at Shinagawa near Tokio in early summer of 1920. They were very young, with three pairs of ambulatory legs, but the hindermost pair were only visible after clarifying. According to Mr. Kishida those pycnogons could neither be referred to *Ammothea* nor to *Nymphon*. Very unfortunately the specimens were all lost in consequence of the conflagration following the great earthquakes occurred in September of 1923. So inadequate though the evidence is, it is probable that those pycnogons were not referable to the same species as that dealt with in the present paper. I here express my cordial thanks to Mr. Kishida for this valuable information and for his kind assistance rendered for my study.

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Rather inconspicuously denticulated spines form a row along the inner side of the four coiling distal segments. First pair of ambulatory legs 8-segmented. Segments 1.-3. are very short, while 5. is the longest, 4. and 6. next to it, and 8. and 9. still shorter. Skin very soft, color whitish or dull yellow. Genital openings unknown.

Locality: Fukuoka, Japan. Found parasitic within the mantle cavity of *Paphia (Tapes) philippinarum*.

Length of proboscis	2.0 mm.
Length of trunk (exclusive of abdomen)	3.5 mm.
Length of abdomen	1.5 mm.
Total length of body	7.0 mm.
Length of the 1st pair of ambulatory legs	12.5 mm.
Length of the 2nd to 4th pairs of ambulatory legs	11-12.0 mm.